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IDENTIFYING ANTECEDENTS THAT INFLUENCE PATIENT ADOPTION OF A HEALTH E-STATION

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Abstract

The Health e-Station, a new e-healthcare facility that recently opened in Peachtree City, Georgia, provides walk-in patient visits via telemedicine to individuals looking to treat minor health conditions. While past research has studied health care practitioner adoption of telemedicine technology, little research has centered on patient adoption of this technology. Drawing upon theoretical models in the health care and technology acceptance literatures, as well as preliminary belief elicitation findings, we present an emerging conceptual model to explain the antecedents leading to patient adoption of a Health e-Station. Thus far, potential adopters identified salient attitudinal, normative, control, and trusting beliefs as antecedents. We close with a description of the methods that will be used to complete this study.

Keywords: Telemedicine, theory of planned behavior, diffusion of innovations, trust, media richness

Introduction

In the United States, the health care industry still lags behind other service industries regarding the integration of information technology with business practices. However, telemedicine innovations are now being used to promote patient empowerment and access to health care. Telemedicine is the use of telecommunication systems to facilitate consultations between health care providers and remote patients (Maheu et al., 2001).

A new application of telemedicine provides health care for minor ailments to walk-in patients via a teleconferencing center. The first model facility of this kind, called the Health-e-Station (HES), opened in August 2006 in Peachtree City, Georgia. Designed primarily to improve access to health care, HES is open during times when primary care facilities are generally unavailable. Proponents of HES argue that its main advantages over emergency rooms are its lower relative cost for services and quicker access to health care providers.

The focus of this paper explores adoption of the telemedicine services that HES offers to consumers, as currently there is a lack of research centered in this area. Existing studies of telemedicine adoption typically target health care practitioners rather than patients (e.g., Chau & Hu, 2002). As such, our understanding of the antecedents leading to patient adoption of various telemedicine services is limited. The proposed research question is the following: *What are the antecedents that influence patient adoption of a Health e-Station?*

Theoretical Background and Research Model

Behavioral Model of Health Services Use

In the health care services literature, the Behavioral Model of Health Services Use (BMHSU) has been a widely used model to explain access to and use of health care services (Andersen, 1995). According to this model, the use of health services is dependent on people's predisposing characteristics, enabling resources, need for medical care, and external environmental factors. Predisposing characteristics include individuals' attitudes, beliefs, knowledge, values, demographic characteristics, and social structure. Enabling resources are the barriers or facilitating conditions that influence decisions to use health care services. Perceived need takes into account how people view their own general health and whether their health state sufficiently warrants need for professional assistance. BMHSU also posits that environmental factors—primarily the health care system—affect health services use. The health care system concept is incorporated in the behavioral model to acknowledge that national health care policy, resources, and organization play a significant role in determining the population's use of health care services.

In this study, perceived need for medical assistance is assumed, and an assessment of the national health care system is beyond the scope of evaluation. Further, demographic characteristics will be used as control variables. Two determinants of use, predisposing characteristics and enabling resources, are conceptually similar to determinants of behavioral intention in the Theory of Planned Behavior. An integration of these two models forms the general underlying framework used in this study (see Figure 1). Only a brief summary of these two theories is offered because they merely provide general guidance in directing the study. The more significant and interesting theoretical contributions are derived from the contextualized responses provided by the respondents in this study.

Theory of Planned Behavior

The Theory of Planned Behavior (TPB) extends the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980) and is a model used to explain and predict behavior (Ajzen, 1991). According to TPB, behavior is a function of individuals' intention to engage in a behavior and their perceived behavioral control in achieving the target behavior. Behavioral intention is determined by individuals' attitudes, subjective norm, and perceived behavioral control.

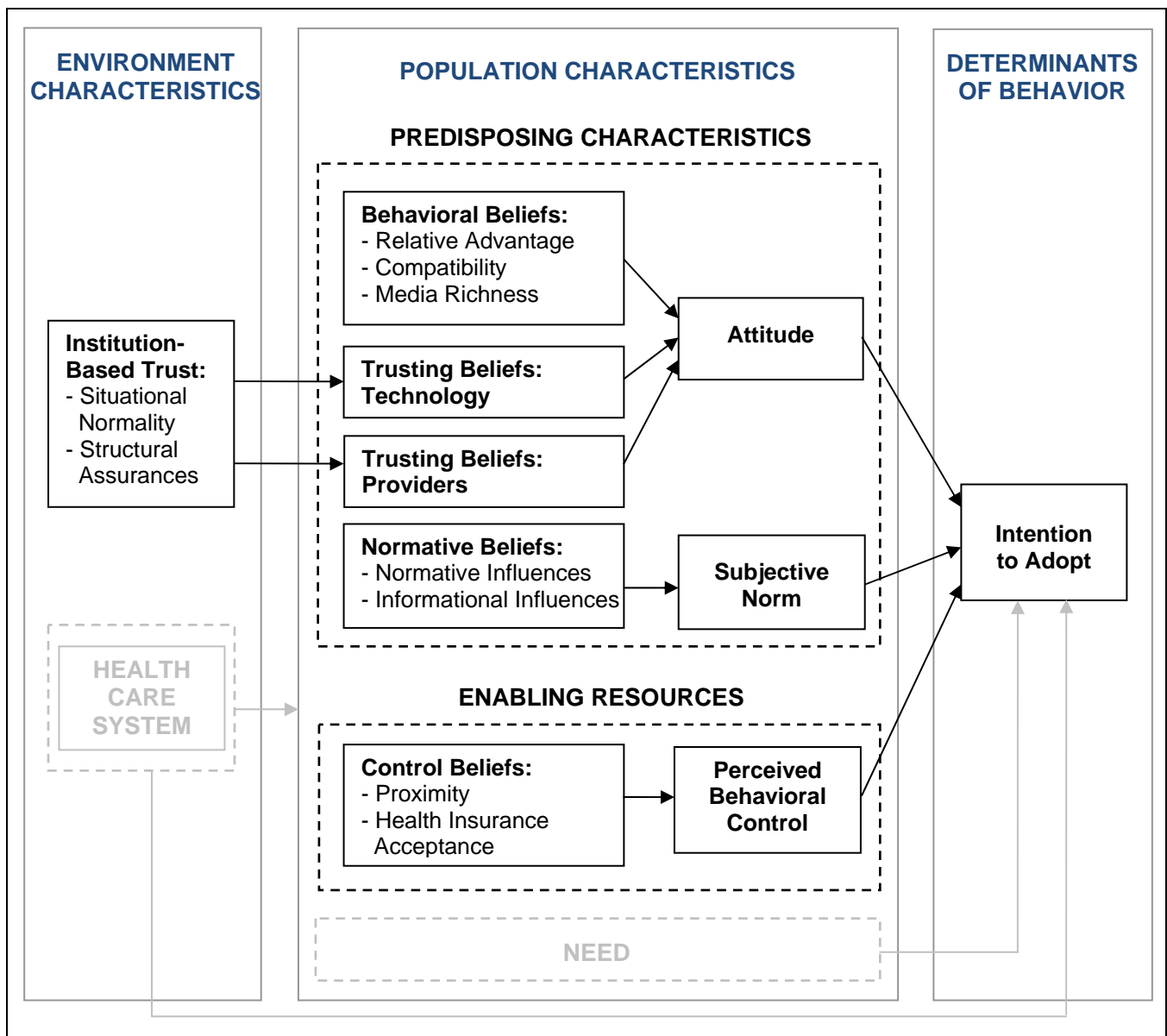


Figure 1. Model of Antecedents Influencing Adoption of a Health e-Station

Attitude is an overall evaluation of the pros and cons of engaging in a behavior and is conceptually similar to the attitudes, beliefs, and values included in the predisposing characteristics construct of the BMHSU. Subjective norm (SN) represents the social element of TPB. The concept of SN suggests that people decide to act, in part, due to their perceptions of referent others' opinions about how they should behave. SN is conceptually similar to the notion of social structure included in the predisposing characteristics construct of the BMHSU. Perceived behavioral control (PBC) refers to one's perceptions of the level of ease or difficulty in engaging in a behavior. PBC is conceptually similar to the enabling resources construct of the BMHSU.

TPB is a well-established model that has been shown to explain and predict behavior in multiple contexts, including the technology acceptance domain (e.g., Taylor & Todd, 1995). According to Ajzen (1991), in order to determine the relative significance of each of these constructs, a belief elicitation process should take place for each phenomenon under study to reveal the salient beliefs that determine a specific behavior. As such, a preliminary belief elicitation process was conducted for this study.

TPB Belief Elicitation Process and Preliminary Results

In order to identify the salient beliefs that form attitudes, SN, and PBC, 12 individuals were interviewed using a belief elicitation process. To illustrate the services that a patient would experience at HES, respondents first viewed an online informational video that described HES. The main focus of the video is to demonstrate a patient examination and discuss the potential benefits and consequences of using a facility of this type. Ajzen and Fishbein (1980) recommend a response frequency of at least 20 percent in identifying the most salient beliefs. Table 1 contains a sorting of the categories and corresponding frequency distributions of 20 percent or greater. In addition to the salient beliefs of TPB, trusting beliefs and perceptions were revealed, and these concepts will be discussed later in the paper.

Concepts from the Innovation Diffusion Theory (IDT) (Rogers, 1995) emerged as behavioral beliefs. The respondents in this study are in the early innovation decision stages of knowledge and persuasion. In the persuasion stage, the perceived characteristics of an innovation are key influences leading to innovation adoption. Empirical studies have identified three of the perceived characteristics—relative advantage, compatibility, complexity—as most significant in explaining and predicting adoption.

Similar to extant empirical findings, the preliminary results of this study indicate that relative advantage is the most salient behavioral belief. Relative advantage is defined as the degree to which an innovation is perceived as being better than its precursor. Three dimensions in particular—wait time, after-hours availability, and cost—arose in more than 50 percent of the responses.

Compatibility is another perceived characteristic of an innovation identified by respondents. Compatibility refers to the degree to which an innovation is perceived as consistent with the existing values and experiences of potential adopters. Karahanna et al. (2006) identify four dimensions of compatibility: compatibility with values, compatibility with existing practices, compatibility with preferred work style, and compatibility with prior experience. The first two dimensions emerged as salient beliefs among our respondents. The latter two do not apply because we are not studying individuals in an organizational context, and our respondents have no prior experience with using HES.

Regarding compatibility with values, some respondents admitted that use of HES is incompatible with their values. For instance, a few respondents indicated that they subscribe to holistic healing teachings and perceived the care provided by HES to be very impersonal. Other respondents said that they associate use of HES with the perpetuation of hasty, profit-driven health care. On the other hand, some respondents made it clear that they had a preference for quick care and associated this type of care with convenience. Typically, these respondents noted that they have very busy schedules, and the use of fast, convenient services is compatible with their routine practices.

Interestingly, complexity has not emerged as a salient behavioral belief. One reason for this may be that this concept is captured in the relative advantage construct. Respondents may be under the impression that HES is easier to use because it purports to provide quick and convenient services to consumers. Thus, respondents may assume that complexity in using HES is a non-issue. Further, at HES, patients do not personally handle the innovation; they do not have to learn or know how to use the technology. Rather, the technology is the medium through which patients receive a service.

Table 1. Frequency of Elicited Salient Beliefs

Salient Beliefs	Description	Frequency (%)
Behavioral Beliefs	Relative Advantage – Wait Time	12 (100%)
	Relative Advantage – After-Hours Availability	10 (83%)
	Relative Advantage – Cost	7 (58%)
	Media Richness	7 (58%)
	Compatibility – Values	5 (42%)
	Compatibility – Practices	4 (33%)
Normative Beliefs	Family Members	7 (58%)
	Health Care Professionals	6 (50%)
	Communication Channel – Word of Mouth	6 (50%)
	Communication Channel – News Media	5 (42%)
Control Beliefs	Proximity	10 (83%)
	Health Insurance Acceptance	6 (50%)
Trusting Beliefs – Technology	Technology Ability	9 (75%)
Trusting Beliefs – Providers	Physician Ability	6 (50%)
Institution-Based Trust	Situational Normality	4 (33%)
	Structural Assurances	7 (58%)

Another concern to respondents is the richness of the media at HES. Many respondents noted that, by its very nature, telemedicine-based health care can not be as comprehensive as in-person health care; when utilizing telemedicine, the physician is limited to visual and auditory senses and can not take advantage of tactile and olfactory senses in making a proper diagnosis. Daft and Lengel (1986) offer that face-to-face communication is richer than telecommunication because face-to-face provides more cues. Thus, a positive relationship exists between the perceived degree of telemedicine technology richness and attitude toward adoption.

In eliciting normative beliefs, IDT concepts also emerged. Karahanna et al. (1999) note that subjective norm is highly related to the concepts of social structure and communication channels found in IDT and propose two types of social influence: normative influence and informational influence. The former refers to a type of influence that motivates individuals to comply with the expectations of others. The latter refers to accepting information from others as evidence of reality. Our respondents indicated that both influences are significant.

In identifying normative influences, two main referent groups were identified: family members and health care professionals. In general, respondents noted that family members care about their family members' health and thus approve of any form of health services use. In regards to health care professionals, some respondents indicated that their health care providers would approve of the respondents' use of HES because their providers would prefer that they take care of their health. Other respondents expressed that health care professionals might disapprove of the use of HES because increased HES visits may translate into reduced profits for traditional health care providers.

According to IDT, communication channels are highly influential factors in the knowledge and persuasion stages of innovation adoption. Mass media channels have a greater impact in the knowledge stage, while interpersonal channels affect decisions more heavily in the persuasion stage. Overall, thus far, respondents have indicated that both types of informational influences would be relevant in their decision to adopt HES. In particular, negative reports about HES via media channels and/or social networks were identified as factors that would dissuade respondents from use of HES.

Two overarching PBC factors were identified: proximity and health insurance acceptance. Respondents mentioned that the closer in proximity HES is to their location, the easier it would be to visit this facility. Furthermore, the facility's acceptance of the respondents' health insurance would be an important factor determining their perceptions of the ease or difficulty in using the facility.

Trust

As previously mentioned, trusting beliefs and perceptions clearly have transpired from the belief elicitation process to date. Mayer et al. (1995) generally define trust as the willingness to take risks in engaging in a behavior. In this

study, we define trust as a patient's willingness to be vulnerable to the actions of e-healthcare parties, based on the expectation that these parties will provide quality health care services to the consumer.

According to Mayer et al.'s integrated model of trust, trust is determined by one's trusting beliefs concerning the trustee, or the object of trust. These trusting beliefs are the trustee's ability, benevolence, and integrity. Ability refers to the degree of aptitude and competencies that the trustee possesses to perform a particular task. Benevolence reflects the goodwill of the trustee—i.e., the extent to which the trustee will do good to the trustor. Integrity refers to the belief that the trustee will adhere to the principles perceived to be acceptable by the trustor.

Trusting Beliefs – Providers

Respondents indicated three categories of health care providers associated with HES: physicians, office staff, and technicians. However, only the belief concerning physician ability surfaced as a salient belief. By and large, individuals revealed positive perceptions regarding trusting beliefs of HES physicians. For example, one respondent explained that she perceived the physicians in her local area to be incompetent; thus, the opportunity to see more capable physicians in other geographic regions via telemedicine appealed to her. Another respondent reiterated these beliefs and went further to state that she would use HES to seek a second opinion because she is consistently disappointed with the inadequate diagnoses of her own health care providers. Thus far, respondents have indicated that their trusting beliefs of HES providers influence their perceived consequences of using HES.

Trusting Beliefs – Technology

While many individuals mentioned that physicians seen at HES will have limited abilities to assess the health conditions of individuals, respondents did not attribute this deficiency to physicians' lack of ability. Rather, respondents attributed this deficiency to the inherent limitations of the telemedicine technology. In other words, the technology's limited abilities inhibit the physicians' abilities to perform their tasks fully. Interestingly, to date, beliefs concerning the abilities, quality, and reliability of the technology have emerged as more salient than trusting beliefs of the health care providers.

In this paper, the theoretical models of trust relate to interpersonal relationships—that is, relationships between human actors. By definition, these models exclude the notion of trust in technological artifacts. However, research has shown that people attribute human characteristics to technological artifacts, and as such, will develop perceptions concerning the trustworthiness of the technology. Further, there is increasing support to suggest that trust in technological artifacts is not so drastically different, theoretically, from trust in human actors (see Wang & Benbasat, 2005 for a recent literature review). Our respondents relayed concerns regarding the image and sound quality provided by the technology. Additionally, some respondents acknowledged that technology is not always reliable and may not always operate as it should. Perceptions concerning system quality and reliability tap into the trusting belief of ability. Respondents have noted that their beliefs concerning the technology affect their perceived consequences of using HES. We believe that sufficient preliminary evidence exists to suggest the inclusion of this construct and relationship in the model, though further investigation is needed to clarify these concepts.

Institution-Based Trust

Institution-based trust (IBT) is defined as the perception that impersonal structures are in place to protect individuals (Shapiro, 1987). McKnight et al. (1998) identify two types of IBT, situational normality and structural assurances. Situational normality refers to the sense that the situation is customary and as expected. Structural assurances refer to the safety nets (e.g., regulations, guarantees, and contracts) an institution puts in place in order to protect individuals.

Regarding IBT, a few respondents in favor of HES use specifically noted that an HES visit did not appear to be too different from a regular physician's visit or an emergency room visit. In contrast, respondents who were skeptical of the efficacy of HES observed low situational normality. The concept of structural assurances surfaced in some of the responses as well. For example, one respondent wondered whether she would have to render payment for services if the technology malfunctioned or if she received a grossly inaccurate diagnosis. In this case, the respondent is inquiring as to whether there are protections or guarantees that minimize the perceived losses she would experience as a result of institutional failures. Further, because HES does not have nurses or physicians on staff, nor the wide range of medical technology resources that a hospital has to treat serious conditions, some respondents suggested that patients' misdiagnoses of the severity of their own symptoms may result in dire consequences. Hence, respondents indicated that they would put more trust in HES if appropriate resources or safeguards were available to

protect patients who have unexpected serious health conditions. Other examples of structural assurances that were mentioned include concerns regarding information security and physical security. Some respondents expressed skepticism that the network-based technology would be a secure channel for protecting their patient confidentiality. Another respondent noted that the late hours held by HES would warrant physical security staff to be present, especially if monetary transactions would take place at the facility. If patients perceive institutional safeguards in place at HES, they would have stronger trusting beliefs both in the health care providers and the technology.

Conclusions

Because HES represents a new type of technology-mediated service that has the potential of increasing access and affordability of health care, practitioners and academics will benefit from understanding the factors that will lead to the diffusion of this innovation. This paper presents preliminary conceptual development and qualitative findings concerning the antecedents that lead to consumer adoption of HES. At this stage, we can abstract some general concepts that will guide the direction of this research. Theories of health services use and behavior provide the general framework to study this phenomenon, and concepts from IDT, media richness, and trust help explain the antecedents of HES adoption.

This study will contribute to the literature in two important ways. As opposed to most technology adoption studies that examine direct use of technology, this study addresses adoption antecedents in the context of indirect use of a technology. Additionally, the adoption of this innovation is widely perceived as an act that inherently carries greater risk than the risk associated with individual adoption of organizational or personal technologies because HES adoption involves individuals' *physical* health and well-being. Hence, we propose that the technology adoption antecedents under study are very different than those traditionally found in the literature and thus merit attention and research efforts.

Future research includes the completion of the belief elicitation process to finalize the theoretical model and develop hypotheses. Subsequently, we will design and validate a survey instrument and administer it to a representative sample of potential HES adopters to test our hypotheses and build upon this research stream.

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